



Router 5000 Family Installation Guide

Router 5012 (3C13701)

Router 5232 (3C13751)

Router 5642 (3C13755)

Router 5682 (3C13759)

<http://www.3com.com/>

Part No. 10014373 Rev. AB
Published September 2005

3Com Corporation
350 Campus Drive
Marlborough, MA
01752-3064

Copyright © 2004, 3Com Corporation. All rights reserved. No part of this documentation may be reproduced in any form or by any means or used to make any derivative work (such as translation, transformation, or adaptation) without written permission from 3Com Corporation.

3Com Corporation reserves the right to revise this documentation and to make changes in content from time to time without obligation on the part of 3Com Corporation to provide notification of such revision or change.

3Com Corporation provides this documentation without warranty, term, or condition of any kind, either implied or expressed, including, but not limited to, the implied warranties, terms or conditions of merchantability, satisfactory quality, and fitness for a particular purpose. 3Com may make improvements or changes in the product(s) and/or the program(s) described in this documentation at any time.

If there is any software on removable media described in this documentation, it is furnished under a license agreement included with the product as a separate document, in the hard copy documentation, or on the removable media in a directory file named LICENSE.TXT or !LICENSE.TXT. If you are unable to locate a copy, please contact 3Com and a copy will be provided to you.

UNITED STATES GOVERNMENT LEGEND

If you are a United States government agency, then this documentation and the software described herein are provided to you subject to the following:

All technical data and computer software are commercial in nature and developed solely at private expense. Software is delivered as "Commercial Computer Software" as defined in DFARS 252.227-7014 (June 1995) or as a "commercial item" as defined in FAR 2.101(a) and as such is provided with only such rights as are provided in 3Com's standard commercial license for the Software. Technical data is provided with limited rights only as provided in DFAR 252.227-7015 (Nov 1995) or FAR 52.227-14 (June 1987), whichever is applicable. You agree not to remove or deface any portion of any legend provided on any licensed program or documentation contained in, or delivered to you in conjunction with, this User Guide.

Unless otherwise indicated, 3Com registered trademarks are registered in the United States and may or may not be registered in other countries.

3Com and the 3Com logo are registered trademarks of 3Com Corporation.

Intel and Pentium are registered trademarks of Intel Corporation. Microsoft, MS-DOS, Windows, and Windows NT are registered trademarks of Microsoft Corporation. Novell and NetWare are registered trademarks of Novell, Inc.

All other company and product names may be trademarks of the respective companies with which they are associated.

CONTENTS

ABOUT THIS GUIDE

Conventions	3
Related Documentation	4

1 INTRODUCING THE ROUTER 5000 FAMILY

Router 5000 Family Software	6
Router 5000 Family Hardware	6
Router 5012 Hardware	8
Router 5232 Hardware	10
Router 5642 Hardware	11
Router 5682 Hardware	12

2 INSTALLING THE ROUTER

Preparing to Install the Router	15
Mounting the Router in a Rack	18
Installing the Router on the Workbench	19
Connecting the Power Cable	19
Connecting the Router to the Console Terminal	19
Installing SICs and MIMs	20
Connecting the Router to the Ethernet	21
Connecting the Router to the WAN	22
Verifying the Installation	23

3 BOOTING AND CONFIGURING THE ROUTER

Connecting the Router to a Local Console Terminal	25
Connecting the Router to a Remote Console Terminal	25
Setting the Parameters of the Console Terminal	26
Powering on the Router	29
Startup Process	30
Configuration Fundamentals of the Router	30
Naming and Arranging Interfaces	32

4 MAINTAINING THE ROUTER

Introduction	33
--------------	----

5 TROUBLESHOOTING

- The Power LED is Off. 43
- Nothing is Displayed on the Terminal after Power-On 43
- Illegible Characters Display on the Terminal after Power-On 44
- Repeated Reboot 44
- Troubleshooting SICs and MIMs 44

A CABLE SPECIFICATIONS

- Console Cable 47
- AUX Cable 48
- Ethernet Cable 48
- Serial Interface Cable 49
- Dumb Terminal Adapter 54
- E1 Cable 54
- T1 Cable 55
- ISDN cables 55

A OBTAINING SUPPORT FOR YOUR PRODUCT

- Register Your Product 57
- Purchase Value-Added Services 57
- Troubleshoot Online 57
- Access Software Downloads 57
- Telephone Technical Support and Repair 58
- Contact Us 58

ABOUT THIS GUIDE

This guide describes the 3Com® Router 5000 Family of routers and how to install hardware, configure and boot software, and maintain software and hardware. This guide also provides troubleshooting and support information for your router.

This guide is intended for the system or network administrator who is responsible for configuring, using, and managing the routers. It assumes a working knowledge of wide area network (WAN) operations and familiarity with communication protocols that are used to interconnect WANs.



Always download the Release Notes for your product from the 3Com World Wide Web site for the latest updates to product documentation:

<http://www.3com.com>

Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions.
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device.
	Warning	Information that alerts you to potential personal injury.

Table 2 Text Conventions

Convention	Description
Screen displays	This typeface represents information as it appears on the screen.
Keyboard key names	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+), for example:
Press Ctrl+Alt+Del	The words "enter" and type"

Table 2 Text Conventions

Convention	Description
When you see the word "enter" in this guide, you must type something, and then press Return or Enter. Do not press Return or Enter when an instruction simply says "type."	Words in <i>italics</i>
Italics are used to:	Emphasize a point.
Denote a new term at the place where it is defined in the text.	Identify menu names, menu commands, and software button names. Examples:
From the <i>Help</i> menu, select <i>Contents</i> .	Click <i>OK</i> .
Words in bold	Boldface type is used to highlight command names in text. For example, "Use the display user-interface command to..."

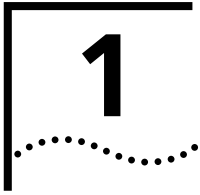
Related Documentation

The following manuals offer additional information necessary for managing your Router 5000:

- *3Com Router Command Reference Guide* — Provides detailed descriptions of command line interface (CLI) commands, that you require to manage the Router 5000.
- *3Com Router Configuration* — Describes how to configure your Router 5000 using the supported protocols and CLI commands.
- *Release Notes* — Contains the latest information about your product. If information in this guide differs from information in the release notes, use the information in the *Release Notes*.

These documents are available in Adobe Acrobat Reader Portable Document Format (PDF) on the CD-ROM that accompanies your router or on the 3Com World Wide Web site:

<http://www.3com.com/>



INTRODUCING THE ROUTER 5000 FAMILY

Routers in the 3Com Router 5000 Family support two types of interface modules:

- Smart Interface Cards (SICs) — small WAN cards
- Multifunctional Interface Modules (MIMs) — larger WAN cards

The routers can be flexibly configured by changing or extending SICs or MIMs, to provide different functions. Your router provides slots for the following modules:

- Router 5012 — 2 SICs and 1 MIM
- Router 5232 — 3 MIMs
- Router 5642 — 4 MIMs
- Router 5682 — 8 MIMs

Software features of the Router 5000 Family include:

- WAN routing capability — Router 5000 Family routers provide full routing of IP using RIP, OSPF, IPX or BGP-4. They also provide WAN support for ISDN, Frame Relay, X.25, PPP, PPPoE, MP, E1, T1, HDLC/SDLC, Sync / Async, Ethernet (broadband)
- Security — Router 5000 Family routers offer RADIUS authentication, advanced filtering, firewall, and support for VPN protocols, including IPsec with IKE, GRE and L2TP
- Powerful backup functionality — Router 5000 Family routers support interface backup, link backup and route backup. The backup can be between a leased line and a dialup line, between a leased line and a virtual link, or between dialup lines. The Router 5000 Family supports mutual backup between such networks as leased line, X.25, PSTN, ISDN, and Frame Relay.
- Voice / Data Convergence — Router 5000 Family routers support QoS, Multicast, 802.1q VLAN, multi-links, load balancing and compression
- Resilience — Router 5000 Family routers support Virtual Router Redundancy (VRRP), Backup Center (Configuration / Port), dial on demand routing, and multilink
- E1/CE1/PRI and CT1/PRI compatibility — Router 5000 Family routers provide CE1 (channelized E1) access, and the CE1 interface is compatible with the E1 interface. In addition, the ISDN PRI function can be implemented on the CE1 interface. CT1 (channelized T1) access is also provided and the CT1 interface is compatible with the PRI interface. This compatibility allows one card to be used for multiple purposes.
- 5012High density ports — The Router 5682 supports a 28 2Mbps sync serial port, which can connect to leased line, Frame Relay, and X.25 networks.

- Fast Ethernet access — Router 5000 Family routers support 100 Mbps access to the local Ethernet and flexible networking configuration.

Router 5000 Family Software

The Router 5000 Family software operates in Synchronous Dynamic Random Access Memory (SDRAM). Flash memory stores router program files and configuration files. Boot ROM stores boot and initialization programs.

Data Security

The Router 5000 Family routers provides data security through the following features:

- Authentication protocols, such as Password Authentication Protocol (PAP), Challenge Handshake Authentication Protocol (CHAP), and Remote Authentication Dial In User Service (RADIUS)
- Firewall and packet filtering to prevent intrusions from external networks
- Virtual Private Network (VPN) for example, GRE, L2TP; IP Security (IPSec); and Internet Key Exchange (IKE) technologies, to guarantee the security of the network in the Internet environment
- Backup solutions based on backup center technology

Online Upgrades

Application and configuration software can be upgraded online with 512 KB Boot ROM and 32MB Flash memory.

Router 5000 Family Hardware

The Router 5000 Family routers share the following hardware features:

- Fixed ports
- Power supply and protection ground
- LEDs

Fixed Ports

The Router 5000 Family routers provide the following fixed ports:

- Console port
- AUX port
- Ethernet port

Table 3 lists the attributes of the Router 5000 Family console port.

Table 3 Router 5000 Family Console Port Specifications

Attribute	Description
Connector type	RJ-45
Interface standard	Asynchronous EIA/TIA-232
Baud rate	9600 to 115200 bps
Default 9600 bps	Services supported
Connecting with character terminal	Connecting with serial ports of the local PCs and operating the terminal emulation program on the PCs
Command line interface	

Table 4 lists the attributes of the Router 5000 Family AUX port.

Table 4 Router 5000 Family AUX Port Specifications

Attribute	Description
Connector type	RJ-45
Interface standard	Asynchronous EIA/TIA-232
Baud rate	300 to 115.2 kbps
Services supported	Modem dial-up
Backup	Operating as the console port when the CON fails
Protocols supported	PPP
SLIP	MP

Table 5 lists the attributes of the Router 5000 Family Ethernet port.

Table 5 Router 5000 Family Ethernet Port Specifications

Attribute	Description
Connector type	RJ-45
Interface type	MDI
Frame format supported	Ethernet _ II
Ethernet _ SNAP	IEEE 802.2
IEEE 802.3	Operating mode
10/100BASE-T Mbps autosensing	Full duplex/half duplex
Network protocol supported	IP, Novell IPX

Power Supply and Protection Ground

Table 6 lists specifications for the Router 5000 Family power supply and protection ground.

Table 6 Router 5000 Family Power Supply and Protection Ground

Item	Description
Power supply input	Rated Voltage: 100-240V, a.c. 50/60Hz Max. voltage 90-264V a.c.50/60Hz
Protection ground	Connecting to ground through ground wire.

LEDs Table below describes the LEDs on the Router 5012

POWER	ON — The module (MIM or SIC) is operating normally. OFF — No module is installed in the current slot or the MIM is not operating normally.
SYSTEM	Flashing-unit is operating normally OFF-power is Off
WAN	Flashing-data is being transmitted from local WAN port OFF-no data transmitted on WAN port
LAN	Flashing-Data is being transmitted on local Ethernet port OFF-no data is being transmitted on local Ethernet port

SLOT 1-3	ON-The MIM the SIC is powered and operating normally. OFF-No module is installed in the current slot or the module is not operating normally.
----------	--

Table 7 describes the LEDs on the Router 5232, 5642, 5682 routers.

Table 7 Router 5232, 5642, 5682 LEDs

POWER	ON — The module (MIM or SIC) is operating normally. OFF — No module is installed in the current slot or the MIM is not operating normally.
SYSTEM	Flashing-unit is operating normally OFF-power is Off
READY	ON-Module found in particular slot OFF-No module found in particular slot
ACTIVE	Flashing-Data is being transmitted by module in corresponding slot OFF-no data is being transmitted in corresponding slot
OFF — The module in the corresponding slot is running abnormally or no module is installed.	ACTIVE
(not on Router 5012)	Data transmission LED
Flashing green — Data is being transmitted by the module in the corresponding slot.	OFF — No data is being transmitted by the module in the corresponding slot.
SERIAL0	(Router 5012 only)
Fixed serial port LED — Shows the status of data that is transmitting on the serial ports.	OFF — No data is being transmitted.
Flashing green — Data is being transmitted.	ETHERNET0/LAN
Fixed Ethernet port LED — Shows the status of data transmission on the fixed Ethernet port.	OFF — No data is being transmitted.
Flashing green — data is being transmitted.	SYSTEM
Hardware system operating LED	Flashing green — The system is operating normally.
ON or OFF — The system is operating abnormally.	POWER
System power LED	ON — Power is on.
OFF — Power is off.	

Router 5012 Hardware

The Router 5012 can function as a small-sized access router by connecting to a leased line or Public Switched Telephone Network (PSTN) through asynchronous serial ports.

The Router 5012 has four fixed ports and three slots.

Figure 1 illustrates the front of the Router 5012.

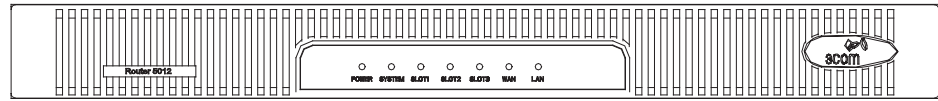
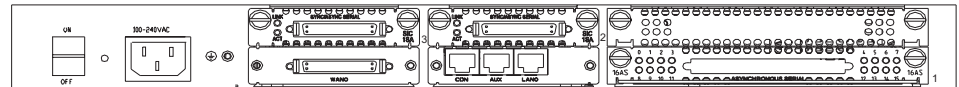
Figure 1 Front View of the Router 5012

Figure 2 illustrates the back of the Router 5012.

Figure 2 Back View of the Router 5012

System Specifications

Table 8 lists system specifications for the Router 5012

Table 8 System Specifications for the Router 5012

Item	Description
Fixed ports	1 AUX port 1 Console port 1 LAN port
1 Console port	1 Synchronous/ asynchronous serial port
1 10/100 Mbps Ethernet port	Slots
1 Encryption Accelerator MIM	2 SIC
Processor	MPC8241 (200Mhz)
Boot ROM	512 KB
SDRAM	128 MB
Flash memory	32 MB
Power supply (external)	Rated voltage: 100-240 V a.c.; 50/60 Hz
Maximum tolerance: 90-264 V a.c.; 50/60 Hz	Input current: 1 to 0.5 A
Output voltage: 12 V d.c.	Output current: 4 A
Max. power	40W
Dimensions (W x H x D)	376.2 x 79.4 x 287.9 mm (15 x 3.2 x 11.3 in), including feet pads
Weight	2.5 kg (5.5 lbs)
Operating relative temperature	0 to 40°C
Operating humidity	5% to 85% (non-condensing)

Fixed Serial Port

In addition to the fixed ports described in "Router 5000 Family Hardware", the Router 5012 provides a fixed synchronous/asynchronous serial port.

Table 9 lists the attributes of the Router 5012 synchronous/asynchronous serial port.

Table 9 Synchronous/Asynchronous Serial Port Specifications

Description	Attribute	Synchronous		Asynchronous
Connector type	DB-50			
Interface standard and operating mode	V.24	V.35		EIA/TIA-232
	DTE, DCE	DTE	DCE	
Minimum baud rate (bps)	1200	1200	1200	300
Maximum baud rate (bps)	64 k	2.048 M	2.048 M	115.2 k
Services supported	Leased line backup Terminal Access			Modem dial-up Backup Dumb terminal access
Protocols supported	Point-to-Point Protocol (PPP) Multilink PPP (MP) Link Access Procedure, Balanced (LAPB) High-Level Data Link Control (HDLC) Synchronous Data Link Control (SDLC) X.25 (ITU-T X series Recommendation) Frame Relay			PPP Serial Line Internet Protocol (SLIP) MP

Router 5232 Hardware

The Router 5232 has four fixed ports and three slots.

Figure 3 illustrates the front panel of the Router 5232.

Figure 3 Front Panel of the Router 5232

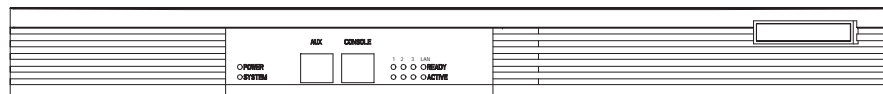
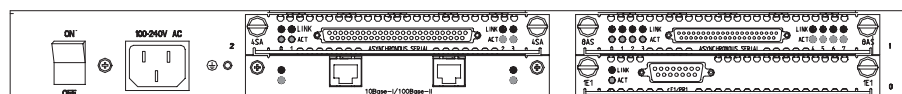


Figure 4 illustrates the back panel of the Router 5232.

Figure 4 Back Panel of the Router 5232 with MIMs installed



System Specifications

Table 10 lists the systems specifications for the Router 5232.

Table 10 System Specifications for the Router 5232

Item	Router 5232 specifications
Fixed ports	1 AUX port 1 CONSOLE port 2 LAN port
Slots	3 (MIM)
Processor	MPC 8245 300 MHz (AC power supply)
NVRAM	128 KB
Boot ROM	512 KB
SDRAM	256 MB
Flash	32 MB
Dimensions (W x H x D)	442 x 44.4 x 413 mm (17.5 x 1.8 x 16.25 in) excluding rubber feet
Weight	8kg (17.64 lbs)
Input voltage	Rated voltage: 100-240 V a.c.; 50/60 Hz Maximum tolerance: 90-264 V a.c.; 50/60 Hz
Max. power	80 W
Operating temperature	0 to 40°C
Operating humidity	5 to 85% (non-condensing)

Router 5642 Hardware

The Router 5642 has two fixed ports and four slots.

Figure 5 illustrates the front panel of the Router 5642.

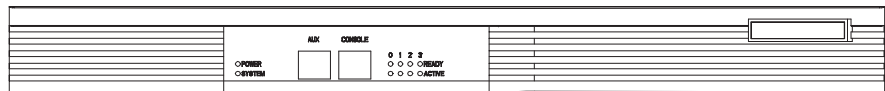
Figure 5 Front Panel of the Router 5642

Figure 6 illustrates the back panel of the Router 5642 with MIM cards installed.

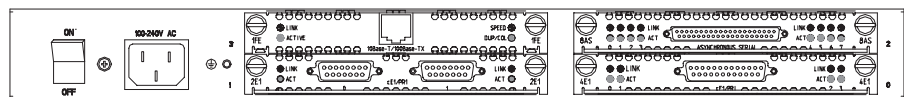
Figure 6 Back Panel of the Router 5642**System Specifications**

Table 11 lists system specifications for the Router 5642.

Table 11 System Specifications for the Router 5642

Item	Router 5642 specifications
Fixed ports	1 AUX port 1 CONSOLE port
Slots	4 (MIM)
Processor	MPC 8245 300 MHz
NVRAM	128 KB

Table 11 System Specifications for the Router 5642 (continued)

Item	Router 5642 specifications
Fixed ports	1 AUX port 1 CONSOLE port
Boot ROM	512 KB
SDRAM	256 MB
Flash	32 MB
Dimensions (W x H x D)	442 x 44.4 x 413 mm (17.5 x 1.8 x 16.25 in) excluding rubber feet
Weight	8 kg (17.64 lbs)
Input voltage	Rated voltage: 100-240 V a.c.; 50/60 Hz Maximum tolerance: 90-264 V a.c.; 50/60 Hz
Max. power	80 W
Operating temperature	0 to 40°C
Operating humidity	5 to 85% (non-condensing)

Router 5682 Hardware

The Router 5682 has two fixed ports and eight slots.

Figure 7 illustrates the front panel of the Router 5682.

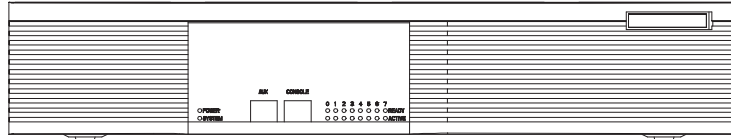
Figure 7 Front Panel of the Router 5682

Figure 8 illustrates the back panel of the Router 5682 with MIM cards installed.

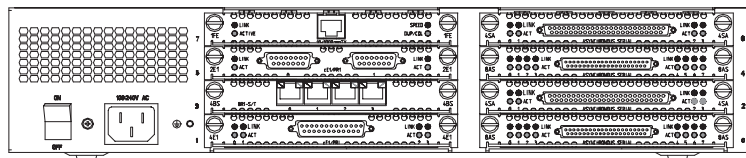
Figure 8 Back Panel of the Router 5682**System Specifications**

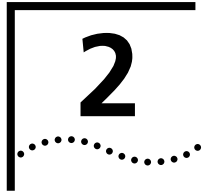
Table 12 lists system specifications for the Router R5682.

Table 12 System Specifications for the Router 5682

Item	Router 5682 specifications
Fixed ports	1 AUX port 1 console port
Slots	8 (MIM)
Processor	MPC 8245 300 MHz (AC power supply and DC power supply)
NVRAM	128 KB
Boot ROM	512 KB

Table 12 System Specifications for the Router 5682

Item	Router 5682 specifications
Fixed ports	1 AUX port 1 console port
SDRAM	256 MB
Flash	32 MB
Dimensions (W x H x D)	442 x 91.2 x 413 mm (17.5 x 3.6 x 16.25 in) excluding rubber feet
Weight	14 kg (30.86 lbs)
Input voltage	Rated voltage: 100-240 V a.c.; 50/60 Hz Maximum tolerance: 90-264 V a.c.; 50/60 Hz
Max. power	120 W
Operating temperature	0 to 40° C
Operating humidity	5 to 85% (non-condensing)



INSTALLING THE ROUTER

There are several ways you can install your router:

- On a vertical surface
- In a rack
- On a workbench

The following sections describe how to prepare and install your router:

- Preparing to Install the Router
- Mounting the Router in a Rack
- Installing the Router on the Workbench
- Connecting the Power Cable
- Connecting the Router to the Console Terminal
- Installing SICs and MIMs
- Connecting the Router to the Ethernet
- Connecting the Router to the WAN
- Verifying the Installation

Preparing to Install the Router

This section provides guidelines for preparing your site and router for installation.

Safety Warnings

Before installing your router, consider the following safety guidelines:

- Switch off the power supply before connecting the cables.
- Keep the router away from heat sources.
- To ensure normal heat dissipation, do not stack routers.
- Do not keep a router in a damp place, and prevent liquid from getting into the router.
- Ensure that the neutral point of the power is grounded properly, to avoid personal injury.
- Ensure that the power is off before plugging or unplugging the interface cards, modules and cables of the router.
- Before removing the chassis, disconnect all the power cords and external cables.
- To avoid damage to the router, connect all the cables correctly. Never connect telephone cables (including the ISDN lines) to the console or AUX port.

- During the installation, wear an Electro-Static Discharge (ESD) preventive wrist strap and ESD-preventive gloves.



3Com recommends that you use an uninterrupted power supply (UPS) with your router.

General Site Requirements

The environment of the installation site influences the performance and lifetime of the router. The installation site for your router should meet the following requirements for temperature and humidity, dust, gases, static electricity, and electromagnetic discharge.

Temperature and Humidity

To ensure normal operation and to prolong the operational lifetime of the router, the temperature and humidity of the equipment room must be within controlled limits. The requirements for the temperature and humidity of the router installation site are listed below.

Table 13 Temperature and Humidity Requirements

Temperature	Relative humidity
0° to 40°C (32° to 104°F)	5% to 85%

Dust

Dust is harmful to the safe operation of the router. The specifications for the dust content and diameter of the granule within the equipment room are listed below.

Table 14 Specification for Dust Content

Maximum diameter (μ m)	0.5	1	3	5
Maximum density (the number of granules per cubic meter)	1.4×10^7	7×10^5	2.4×10^5	1.3×10^5

Gases

The equipment room of the router must meet strict requirements for the content of salt, acid and sulfide. The specific limitation values of these harmful gases are given below.

Table 15 Harmful Gas Limitation Values in Equipment Room

Gas	Average (mg/m³)	Maximum (mg/m³)
SO ₂	0.2	1.5
H ₂ S	0.006	0.03
NO ₂	0.04	0.15
NH ₃	0.05	0.15
Cl ₂	0.01	0.3

Static Electricity

To prevent damage caused by the static electricity, ensure that:

- The equipment is grounded

- The equipment room is dust-proof
- Adequate temperature and humidity conditions prevail
- The operator wears the ESD-preventive wrist strap, ESD-preventive gloves and ESD-preventive clothes while handling the circuit board.
- The dismantled circuit board is placed upward on the ESD preventive workbench, or put into an ESD preventive bag.
- You avoid direct contact with the elements of the circuit board.

Electromagnetic Discharge

To prevent damage by electromagnetic discharge, do the following:

- Take effective measures against electrical interference for the power supply system.
- Separate the working ground of the router from the grounding device of the power equipment, or thunder proof grounding.
- Keep the router away from wireless launchers, radar launchers and other high frequency and high current equipment.
- Adopt electromagnetic shielding if necessary.

Lightning Damage

To minimize the risk of lightning damage do the following:

- Install a lightning arrester on the input end of a telephone cable, ISDN line or T1/E1 line.
- Ensure that the PGND wire of the chassis is well grounded
- Ensure that the neutral point of the socket of AC power supply is well grounded
- Install a lightning arrester at the input end of the power supply

Workbench Requirements

Whether you install the router in a rack or place it directly on the workbench, it is necessary to ensure that:

- Airflow is not restricted around the router.
- The cabinet and workbench are strong enough to support the weight of the router and other installation accessories.
- The cabinet and workbench are well grounded.

Installation Checklist

After you verify that the installation conditions comply with these requirements, open the packing case of the router and check the contents against the your order contract. Contact your Service representative if you find any discrepancies.

To install your router, you will need:

- Tools
 - Phillips screwdriver
 - Flat-head screwdriver
 - ESD-preventive wrist strap and ESD-preventive gloves
 - Flat-blade screws (used in wall mounting)

- Cables
 - Ethernet cable
 - Console cable
 - AUX cable
 - Power supply (for the Router 5012), power cord and chassis ground wire
 - Interface cables for the selected interface modules
- Equipment
 - A router
 - Optional SICs and MIMs
 - Ethernet 100BASE-T Hub or LAN switch
 - Channel service unit/data service unit (CSU/DSU) or other data communications equipment (DCE) equipment (such as a modem)
 - Configuration terminal, such as a PC
 - Additional equipment for the selected interface modules

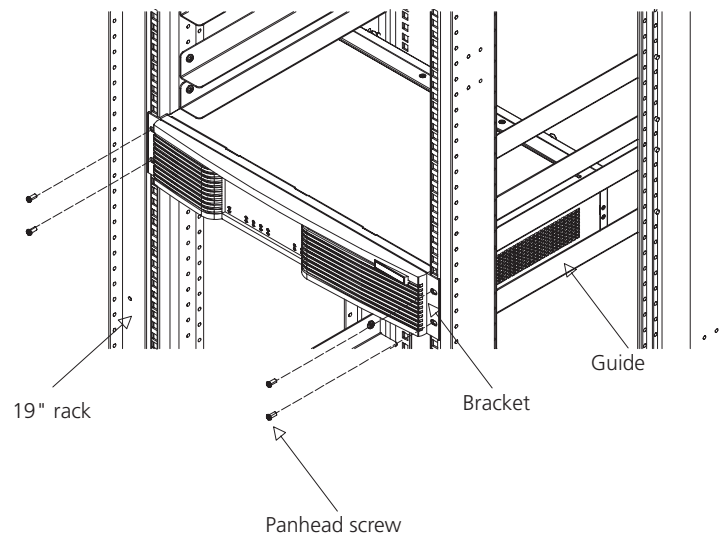
1

Mounting the Router in a Rack

The Router 5232, Router 5642, and Router 5682 can be mounted in a standard 19-inch rack. To install a router in a rack:

- 1** Check the grounding condition and stability of the rack. Secure the fastening brackets to both sides of the front and rear panels of the router.
- 2** Place the router on one of the trays in the rack. Move the router into position along the guide rail in the rack.
- 3** Ensure that the router is level and securely fixed. Use pan head screws to fasten the brackets to the rack. The pan head screws should be anti-rust and should satisfy the rack installation requirements.
- 4** Ensure that the ventilation holes are not obstructed.

Figure 9 Rack-Mounting a Router



Installing the Router on the Workbench

You can install any Router 5000 on a workbench.

To install the router on a workbench, take the following precautions:

- Ensure that the workbench is smooth and stable.
- Leave a heat-dissipation clearance of 10 cm (4 in) around the router.
- Do not put heavy objects on the router.

Connecting the Power Cable

To connect the router to the power outlet and confirm that the PGND wire is properly grounded, do the following:

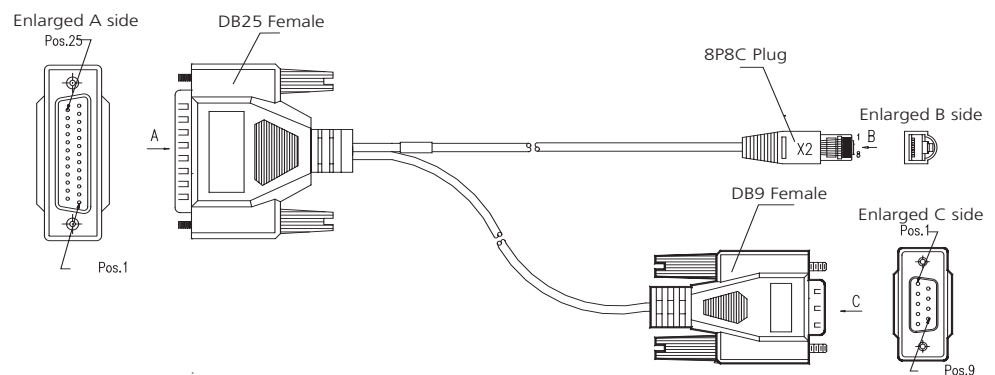
- 1 Connect the output end of the power socket on the rear panel of the router.
- 2 Connect the input end to the AC power outlet.
- 3 Turn on the power switch on the router.
- 4 Confirm that the router has power by checking whether the POWER LED is on.

Connecting the Router to the Console Terminal

The Router 5000 provides a console port, through which you can configure the router.

The console cable is an 8-core shielded cable. The end that is used to connect to the console port of the router has an RJ-45 connector. At the other end of the console cable has both a DB-9 (female) adapter and a DB-25 (female) adapter. Use the appropriate connector for the port on the console terminal.

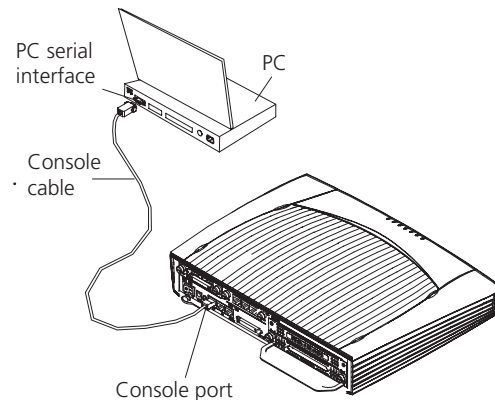
Figure 10 Console Cable Assembly



To connect the router to a console terminal:

- 1 Turn off power to the router.
- 2 Select a console terminal — This can be either a standard ASCII terminal with an RS-232 serial port, or a PC.
- 3 Connect the cable — Turn the power switch off, and then connect the serial interface of the console cable to the console port of the router.

Figure 11 Connecting the Console Port to the PC (router shown for illustration only)



After connection, power on the router. The startup information of the router is displayed on the console terminal.

Installing SICs and MIMs

Before you install a SIC or MIM, assemble the following equipment:

- Flat-blade screwdriver
- Anti-static wrist strap



The Router 5000 Family routers do not support hot swappable SICs and MIMs. To avoid injury from electric shock or damage to a router, put on an anti-static wrist strap, make sure that power to the router has been turned off and that the power cord has been unplugged before performing any of the following operations.

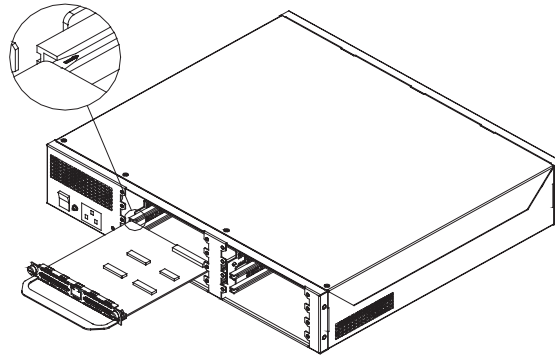
Before you can install a SIC or MIM, you must remove the filler panel from the slot. Remove the captive screws of the blank filler panel by unscrewing them in a counter-clockwise direction with the flat-blade screwdriver, as shown below.



Do not remove the blank filler panel with black film above SLOT0.

To install a SIC or MIM:

- 1 Turn the router so the rear panel faces you.
- 2 Turn off the power switch of the router and unplug the power cord.
- 3 Match the remote edge of the module with the slot on the router's rear panel.
- 4 Push the module into the router until its front panel is level with the back panel of the router.
- 5 Fasten the module into the router with the captive screws.
- 6 Power on the router, and check the LED of the corresponding slot on the front panel. After the initialization of the module, if the LED for the corresponding slot is on, the module is operating normally. If the LED for the corresponding slot remains off, the POST for the module has failed and you should contact your Service representative.

Figure 12 Installing a SIC or MIM

Connecting the Router to the Ethernet

The Router 5000 Family routers provide a fixed 100BASE-TX fast Ethernet port that uses category-5 twisted pair cable.

Note the following before you connect:

- The fixed Ethernet cables are supplied with the router.
- Use shielded cables to ensure electromagnetic compatibility.
- Identify the mark on the module so you can plug the cable in correctly.
- When connecting the Ethernet cable to a LAN Switch, plug the cable into the 10/100BASE-T interface marked with MDIX.

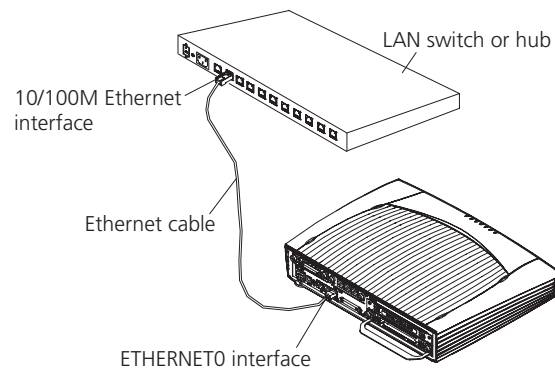
To connect the Ethernet cable:

- 1** Turn off power to the router.
- 2** Select the Ethernet cable.

While connecting the router with a PC or a router, use the crossover network cable.

When connecting the router to a hub or a LAN switch, use the straight-through network cable.

- 3** Connect one end of the Ethernet cable to the appropriate Ethernet port on the router.
- 4** Connect the other end of the Ethernet cable to the Ethernet port of the network device.
- 5** Verify the connection by checking that the 100M ETH LED on the top of the router is on.

Figure 13 Connecting the Router to the Ethernet

Connecting the Router to the WAN

The Router 5000 Family provides two fixed WAN ports, and gives you the option to install further WAN ports as required. The fixed ports are the AUX port and the serial port. The additional ports are provided by the SICs and MIMs supported by the Router.

Connecting the AUX Port to the Modem

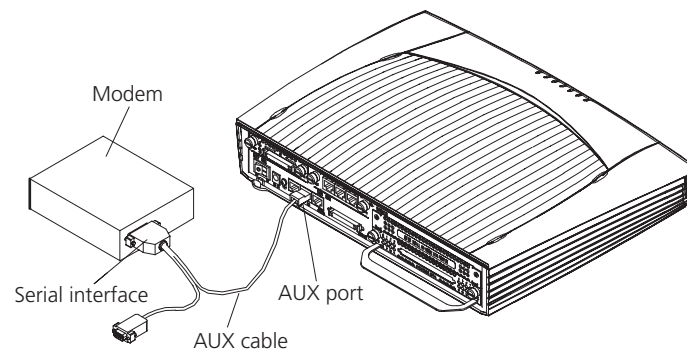
The auxiliary (AUX) port is a serial port that is used for remote configuration or dial-up backup. To connect the router to a remote device, a local modem must be connected to a remote modem through PSTN. For the connection method, see Chapter 5. For AUX port specifications, see Chapter 1.



If the console port fails, the AUX port can also serve as a console port.

To connect the AUX cable:

- 1 Turn off power to the router.
- 2 Plug the RJ-45 connector of the AUX cable into the AUX port of the router.
- 3 Connect the DB-25 or DB-9 adapter of the AUX cable to the serial port of the analog modem, as shown below.

Figure 14 Connecting the AUX Port to the Analog Modem

Connecting the Serial Port to a CSU/DSU

The serial port is usually used to connect the router to DSU/CSU.

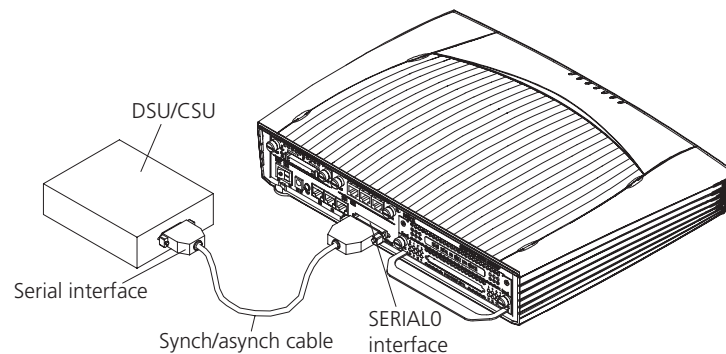


Plugging or unplugging the connectors of the serial cable on line can damage the router or the remote device.

Use the following procedure to connect the serial cable (take the connection from SERIAL0 to DSU/CSU):

- 1 Turn off power to the router.
- 2 Choose the appropriate serial cable.
- 3 Plug the DB-50 adapter of the cable into the SERIAL0 port of the router.
- 4 Connect the other end of the cable to the CSU/DSU device. (If the WAN uses a dial-up line, connect the cable to the serial port of the analog modem.)

Figure 15 Connecting the Serial Port to DSU/CSU



Verifying the Installation

Verify whether the router has been correctly installed by checking the following items:

- There is airflow around the router
- Power is connected correctly
- The ground wire of the router is correctly connected
- The router is connected to other devices, such as the console terminal

3

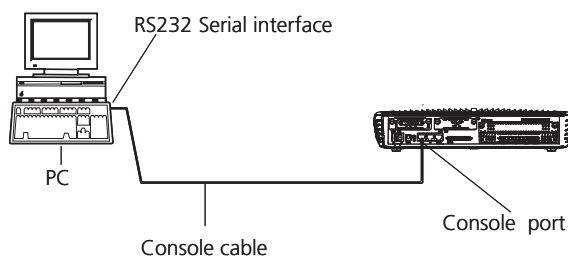
BOOTING AND CONFIGURING THE ROUTER

During the initial configuration of the router, you can use only the console or AUX port. This chapter describes how to connect the router to a local or remote console terminal and how to set parameters at the console terminal.

Connecting the Router to a Local Console Terminal

To set up the local configuration environment, connect the RJ-45 connector of the console cable to the console port on the router, and the DB-25 connector or DB-9 connector to the serial port of a PC, as shown below.

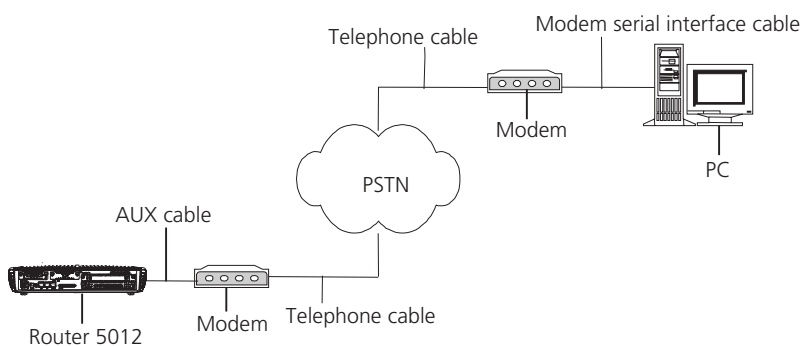
Figure 16 Local Configuration Through the Console Port



Connecting the Router to a Remote Console Terminal

To set up the remote configuration environment, you must connect a local modem to the serial port of a local PC. Connect a remote modem to the AUX port of the remote router using an AUX cable. Use PSTN to connect the local and remote modems, as shown below.

Figure 17 Remote Configuration Through the AUX Port



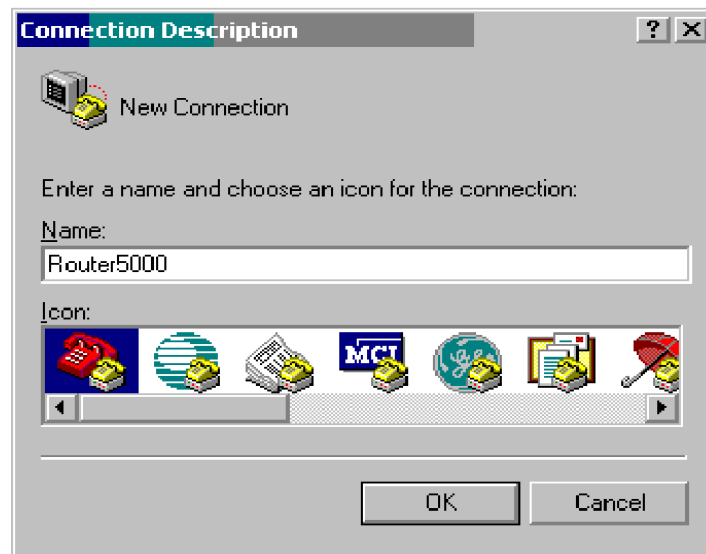
Setting the Parameters of the Console Terminal

To set terminal parameters:

- 1 Start the PC and select *Start > Programs > Accessories > Communications > HyperTerminal*.

The HyperTerminal window displays the Connection Description dialog box, as shown below.

Figure 18 Connection Description Dialog Box

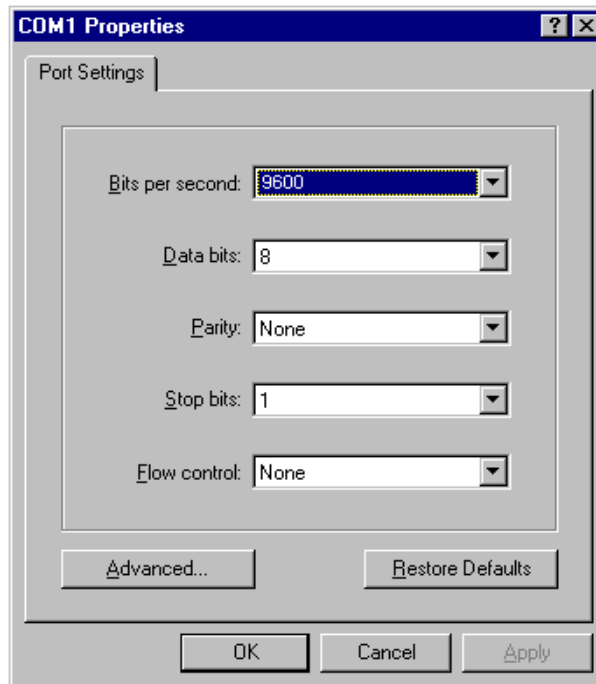


- 2 Enter the name of the new connection in the *Name* field and click *OK*. The *Connect To* dialog box, shown below displays.

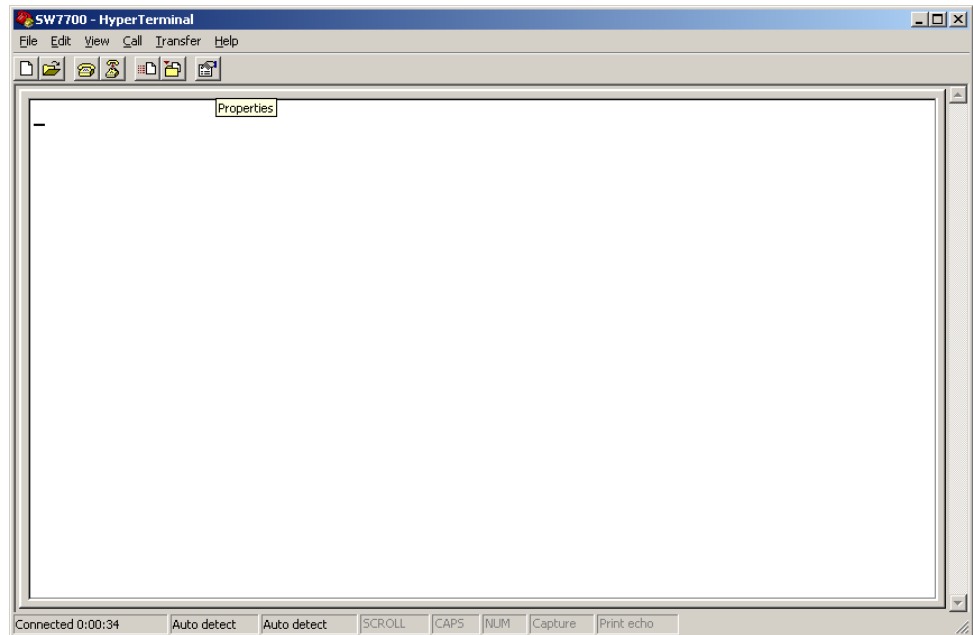
Figure 19 Connect To Dialog Box



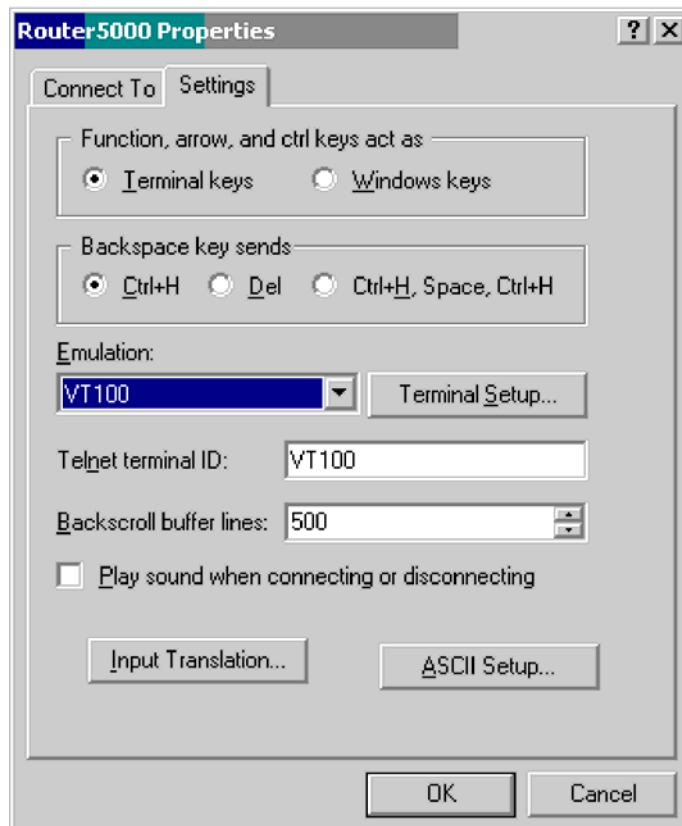
- 3 Select the serial port for the connection from the *Connect using* dropdown menu and click *OK*. The Connection Properties dialog box, shown below displays.

Figure 20 Connection Properties Dialog Box

- 4 Set the following parameters:
 - Bits per second — 9600
 - Data bits — 8
 - Parity — None
 - Stop bits — 1
 - Flow control — None.
- 5 Click OK. The HyperTerminal dialog box displays, as shown.

Figure 21 HyperTerminal Window

- 6 Select *Properties*. The *Properties* dialog box for your connection displays.
- 7 Click the *Settings* tab, as shown.

Figure 22 Settings Tab

- 8 In the *Emulation* dropdown menu, select *VT100* or *Auto detect*. Click *OK*.

Powering on the Router

Before you power on the router, verify that:

- The connection between the power cord and ground wire is secure
- The voltage of the power supply complies with the requirement of the router
- The console cable is correctly connected to either the PC or the terminal, and that the parameters are correct.



Before switching on the power, locate the power-off switch in the workroom so that, in case of an electrical accident, power can be turned off quickly.

Turn on the power switch of the router.

Checking and Operating after Power-on

After the router is powered on, verify that:

- The LEDs on the front panel are normal.

During the power-on self-test (POST), the memory test is successful if the LEDs light in the following sequence:

1. SLOT0 to 2 and SERIAL0
2. SLOT1 and 2

If SLOT0 and 1 LEDs light, the memory test failed.

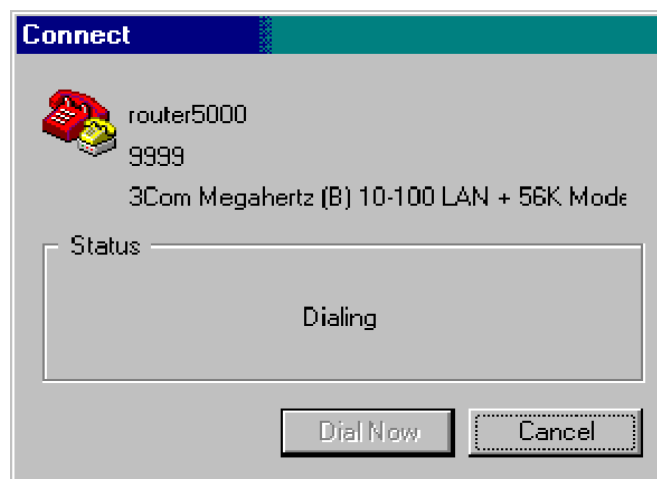
For the status of the LEDs during normal operation after power-on, see the LED tables in Chapter 1.

- The console terminal display is normal

For the local configuration, the startup interface on the console terminal displays after the router is powered on.

For the remote configuration, you must dial up, using HyperTerminal, after the router is powered on, as shown. After the dial-up, the startup interface is displayed on the terminal.

Figure 23 Connect Dialog Box



After the POST, press *Enter*. When the [3Com] prompt displays, you can configure the router.

Startup Process

After the router starts up, the Boot ROM program runs and the following information displays on the terminal screen:

```
Booting
*****

*           3Com Router Boot Rom, V4.60

*****

Copyright(C) 2002-2005 by 3Com Corporation, Inc.
Compiled at 20:46:59 , Jan 23 2003.

Now testing memory...OK
256M    bytes  SDRAM
8192k   bytes  flash memory

Press Ctrl-B to Enter Boot Menu
```



The contents displayed on the terminal can vary with different versions of Boot ROM.

If you press Ctrl+B immediately, the system displays the Boot Menu. If you do not press Ctrl+B, the system initiates the program decompression process.



After "3Com Router Boot Rom, V4.60" appears, "Booting" disappears.

When the system begins the decompression and initialization process, the screen displays:

```
Now system is self-decompressing...
System now is starting...

Press ENTER to get started
```

Press *Enter*. The system displays the [3Com] prompt, which indicates that the router has entered the system view and you can configure the router.

Configuration Fundamentals of the Router

The configuration process includes the following steps:

- 1 Clarify your networking requirements. These requirements include:
 - The connectivity requirements of the remote sites
 - The types of LAN and WAN interfaces required for the network
 - The configuration of IP and IP subnet settings and any other protocols
 - The network reliability, management, and security policies
- 2 Based on your network requirements, draw a clear and integrated networking diagram.

- 3 Configure the WAN interface of the router:
 - Configure the physical operating parameters (the operating mode of the serial port, baud rate, and synchronous clock) of the interface according to the transmission medium of the WAN. For the dial-up port, you need to configure DDR parameters.
 - Configure the link layer protocol encapsulated on the interface and the related operating parameters according to the type of the WAN.
- 4 Configure the IP addresses or IPX network number for all the ports of the router according to the division of the subnets.
- 5 Configure the routes. If you have to start up the dynamic routing protocol, configure the related operating parameters of the protocol.
- 6 Create the security configuration for the router, as necessary.
- 7 Create the reliability configuration for the router, as necessary.

SNMP Management For help managing routers on your network, you can use 3Com Network Director software to discover, map, and display network links and IP devices.

To allow Network Director to monitor your routers, you must first configure SNMP V1 with the following commands:

```
[ 3Com]snmp-agent sys-info version v1
[ 3Com]snmp-agent community read <read-community-string>
[ 3Com]snmp-agent community write <write-community-string>
```

To learn more about Network Director, on the 3Com Corporation World Wide Web site, enter this URL into your Internet browser:

<http://www.3com.com/3nd>

Command Line Interface The command line interface of the Router 5000 routers provides commands to configure and manage the router. The command line interface has the following characteristics:

- Performs local configuration through the console port.
- Performs local or remote configuration through the **telnet** command, which can be used to log on directly and manage other routers.
- Implements the configuration on the router through the terminals (the asynchronous interface, including those connected to the AUX port and AS port) in dumb terminal mode.
- Configures the hierarchical user protection (guest, operator, administrator). Only administrator users are authorized to configure and manage the routers.
- Online help, available by typing ? at any time.
- Provides network diagnostic tools, such as Tracert and Ping, to quickly diagnose the availability of the network.
- Provides detailed debugging information to diagnose network faults.
- The command line interpreter adopts fuzzy search for the keywords of the command. A conflict-free keyword if entered, will be interpreted accordingly. For example, for a **display** command, you can enter **dis**.

To facilitate the management of the router in the system view, all the commands are grouped. Each group corresponds to a view. Users can use these commands to switch between different views. Many commands are limited to use in a single view. Other commands (such as **ping**, **display current-configuration**, **interface**) can be executed in all views.

Help for the Configuration

Router 5000 Family routers provide online Help for the command line interface:

- In any view, enter ? for all the commands in the view and a brief description of each command.
- Enter a command, followed by a space and ?, in the keyword position for a list of all keywords and a brief description of each one.
- Enter a command, followed by a space and ?, in the argument position for a description of related arguments.
- Enter a character string, followed by a space and ?, for a list of all commands that begin with the character string.
- Enter a command, followed by a character string and ?, for a list of all keywords that begin with the string.

Naming and Arranging Interfaces

The Router 5000 FamilyRouter 5000 Family routers support the following ports:

- CON
- AUX
- Ethernet
- Serial (synchronous/asynchronous)
- Asynchronous
- E1/T1
- ISDN

The sequence number of each type of port begins with 0.

Inside the interface card, the order of the interface is arranged by serial numbers on the interface card, from left to right.

4

MAINTAINING THE ROUTER

Introduction

The files managed by the Router 5000 are of 3 types:

- Boot ROM program files used by the Router to boot the application program files
- Application files (main software)
- Configuration files

This chapter will introduce you with three methods:

- Application and Boot ROM programs upgrade via XModem
- Application program upgrade via TFTP
- Application program and configuration file upload/download via FTP

Boot Menu

Boot Menu:

- 1: Download application program with XMODEM
- 2: Download application program with NET
- 3: Clear configuration
- 4: Clear application password
- 5: Start up and ignore configuration
- 6: Enter debugging environment
- 7: Boot Rom Operation Menu
- 8: Do not check the version of the software
- 9: Exit and reboot

Enter your choice(1-9):

Options of Boot menu are described as follows:

- 1** Download application program with Xmodem.
- 2** Download application program with Ethernet.

This option leads you into NET port download menu, which includes these options:

Net Port Download Menu:

- 1: Change Net Parameter
- 2: Download From Net
- 3: Exit to Main Menu

Enter your choice(1-3):1

- 3** Clear the configuration file.

4 Clear application program password.

This option clears super user password. This option functions for only one time and password authentication for super users is restored after the router is rebooted.

5 Ignore configuration file and start up with initial configuration.**6** Enter debugging environment in case of faults.**7** Boot menu provides two methods for upgrading the program and the Boot ROM sub-menu operations, which are introduced in the following subsections.

Options of Boot ROM operation menu include:

Boot ROM Download Menu:

- 1: Download Boot ROM with XModem
 - 2: Download Extended Segment of Boot ROM with XModem
 - 3: Restore Extended Segment of Boot ROM from FLASH
 - 4: Backup Extended Segment of Boot ROM to FLASH
 - 5: Exit to Main Menu
- Enter your choice(1-5):

This menu provides options to upgrade, back up or restore Boot ROM program. .



CAUTION: *It is recommended to upgrade the software under the guidance of the technical support personnel. In addition, when upgrading the router, note to match the version of the Boot ROM software with that of the main software.*

Upgrading Application Program and Boot ROM through XModem Protocol

When upgrading the software through the XModem protocol, you can simply use the console port rather than building up another configuration environment.

Upgrading application program

- 1** Enter the Boot menu (refer to the 1.1.1 Boot Menu), press <1> to select the XModem protocol for downloading the application program. The following download speeds are available for the router:

```
Downloading application program from serial ...
Please choose your download speed:
1: 9600 bps
2: 19200 bps
3: 38400 bps
4: 57600 bps
5: 115200 bps
6: Exit and reboot
Enter your choice(1-6):
```

- 2** Select an appropriate download speed. For example, enter <5> to select the download speed 115200 bps and the router will prompt:

```
Download speed is 115200 bps. Change the terminal's speed to 115200
bps, and select XModem protocol. Press ENTER key when ready.
```

- 3** According to the above information, change the baud rate set at the console terminal for keeping it in consistency with the selected software download baud rate. After that, disconnect the terminal (that is [Dial-in/Disconnect]), reconnect it (that is [Dial-in/Dialing]) and then press <Enter> to begin downloading. The system will prompt:

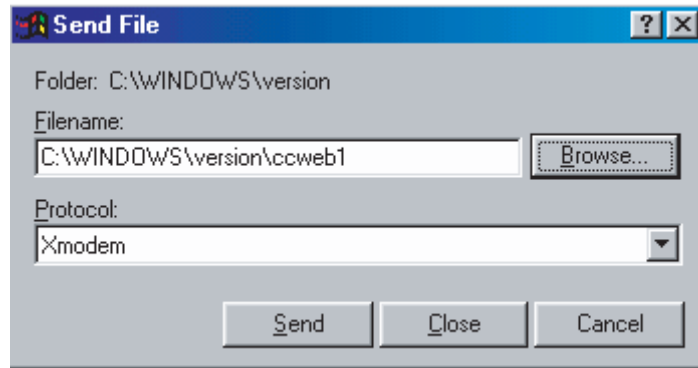
Downloading ... CCCCC



After the baud rate at the console terminal is set, the new setting can become valid only if the terminal emulation program is disconnected and reconnected for at least once.

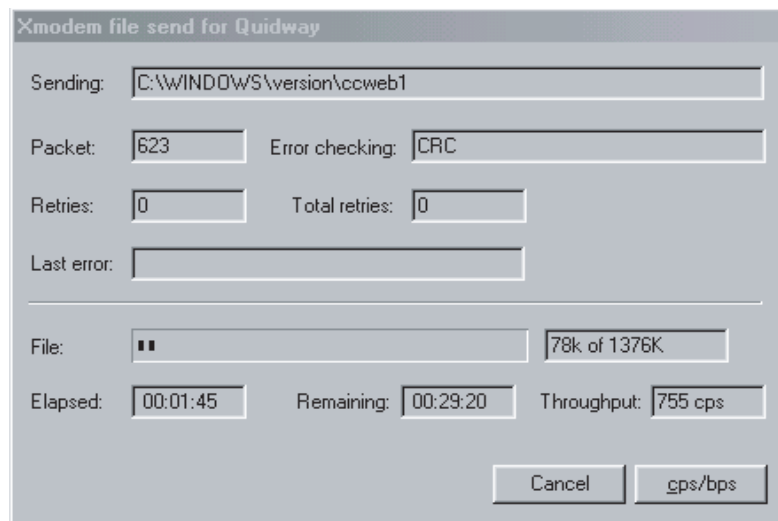
- 4 Select [Transmit/send file] in the terminal window and the following dialog box will pop up:

Figure 24 Send File dialog box



- 5 Click <Browse>, select the application file to be downloaded, and set the protocol to Xmodem. Then click <Send>, and the system will pop up the following interface:

Figure 25 Sending file interface



- 6 After completing download, the system begins writing to Flash (Flash memory), then the following information will be displayed in the terminal interface, indicating that the download has been completed:

```
Download completed.
Writing to flash memory...
Please wait,it needs a long time .Please wait...
#####
Writing FLASH Success.
```

Please use 9600 bps. Press <ENTER> key to reboot the system.

Then restore the baudrate of the configuration terminal to 9600bps as per the prompt (disconnection and re-dialing are also required here), and then the system start up normally.

Upgrading the entire Boot ROM program

- 1 Enter Boot menu, select <7> to turn to Boot ROM operation menu.
- 2 Select <1> in the Boot ROM operation sub-menu to download the Boot ROM program with XModem. The Router provides you with several speeds. The subsequent operation steps are the same as those described in



CAUTION: *If the all Boot ROM program fails during upgrade, it cannot be restored on site. Therefore, only when necessary can you upgrade the whole Boot ROM, besides, you must upgrade under the guide of technical support personnel.*

Upgrading the extended

- 1 Enter Boot menu, select <7> to turn to Boot ROM operation menu.
- 2 Select <2> in the operation sub-menu to upgrade the extended segment of Boot ROM program with XModem. The Router provides you with several speeds. The subsequent operation steps are the same as those described earlier

Backing up and Restoring the Extended Segment of Boot ROM Program

Backup the extended segment of Boot ROM Program in FLASH

- 1 Enter Boot menu, select <7> to turn to Boot ROM operation menu.
- 2 Select <4> in the operation sub-menu to copy the current extended segment of Boot ROM program into the FLASH, and then the following information will be displayed in the terminal interface if the restoring operation is successful.

```
Writing to FLASH.Please wait...####
```

```
Backuping Boot ROM program to FLASH succeeded!
```

- 3 When the sub-menu appears again, select <5> to exit the Boot menu and proceed to execute the router's main software.

Restore the extended segment of Boot ROM program from FLASH

In case that faults occur to the extended segment of the Boot ROM program that is in use or you upgrade the extended segment wrongly, you can restore the extended segment saved in FLASH into the Boot ROM by doing the following:

- 1 Enter Boot menu, select <7> to turn to Boot ROM operation menu.
- 2 Select <3> in the operation sub-menu to to restore Boot ROM from FLASH, and then the following information will be displayed if the restoring operation is successful.

```
Writing to Boot ROM.Please wait...#####
```

```
Restoring Boot ROM program succeeded!
```

- 3 When the sub-menu appears again, select <5> to exit the Boot menu and proceed to execute the router's main software.

Upgrading Application Program with Ethernet

It refers to downloading application program through Ethernet port. The router serves as client, so it needs to be connected to TFTP Server or FTP Server through its fixed Ethernet port. The following are the details.



CAUTION: TFTP Server or FTP Server program is not included in 5000 Family routers, so you have to buy and install it.

Both TFTP loading and FTP loading are available in 5000 Family routers.

- 1 Start TFTP server or FTP server at the PC connecting the Ethernet port of the router and configure path for the files to be loaded. For FTP Server, you should also set username and password.
- 2 Enter NET download menu
- 3 Select <2> in BOOT menu to turn to NET download menu.

Net Port Download Menu:

```
1: Change Net Parameter
2: Download From Net
3: Exit to Main Menu
Enter your choice(1-3):1
```

- 4 Configure parameters

Select <1> in NET download menu to turn to parameter configuration interface.

Change Boot Parameter:

```
'.' = clear field; '-' = go to previous field; ^D = quit
boot device          : fei0
processor number     : 0
host name            : 8040
file name            : M8240ram.arj
inet on ethernet (e) : 169.254.10.10
inet on backplane (b):
host inet (h)        : 169.254.10.11
gateway inet (g)     :
user (u)             : 8040
ftp password (pw) (blank = use rsh):
flags (f)            : 0x0
target name (tn)     :
startup script (s)   :
other (o)            :
```

- 5 Configure these parameters for TFTP mode

file name: File name to be loaded

inet on ethernet (e): IP address for the Ethernet port for loading

host inet (h): IP address for TFTP Server

flags (f): The flag must be 0x80 for TFTP mode

- 6 Configure these parameters for FTP mode

file name: File name to be loaded

inet on ethernet (e) : IP address for the Ethernet port for loading

host inet (h) : IP address for FTP Server

user (u): User name, which must be consistent with that for FTP Server

ftp password (pw) (blank = use rsh): Password, which must be consistent with that for FTP Server

flags (f): The flag must be 0x0 for FTP mode

These parameters will be saved automatically when your configuration is completed.

Router restarts after successful upgrading

Press <Enter> to return to NET download menu and select <2>, and then this information is prompted:

```
boot device          : fei
unit number         : 0
processor number     : 0
host name           : 8040
file name           : Q8040.BIN
inet on ethernet (e) : 10.110.27.235
host inet (h)       : 10.110.27.231
user (u)            : 8040
ftp password (pw)    : 8040
flags (f)           : 0x80
```

```
Attached TCP/IP interface to fei0.
Subnet Mask: 0xfffff800
Attaching network interface lo0... done.
```

```
Loading...
NET download completed...
read len = [04378489]
Please wait,it needs a long time
#####
#####
#####
Writing Vrpsoftware File Succeeds!
Press <Enter> key to reboot the system .
```

7 Press <Enter> to reboot the system.

Uploading/Download Application, Boot ROM program and Configuration File Using FTP

3Com 5000 Family Routers provide FTP Server function, which gives another approach for updating application file, Boot ROM program or configuration file. Any FTP Client (including local and remote users) connected to a router can perform the operation. Configuration file, Boot ROM program or application files can be uploaded/downloaded if the user passes authentication. Follow these steps to upload/download the application/Boot ROM program/configuration file through FTP:

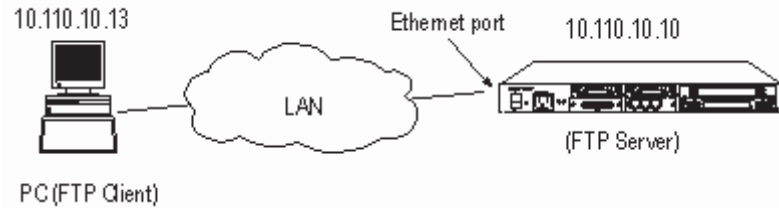


Upload: Transmit files from the PC running as FTP client to the router connected to the PC via the Ethernet interface, that is, perform the put operation.

Download: Transmit files from the router to the PC running as FTP client, which is connected to the Ethernet interface of the router, that is to implement the get operation.

Build up FTP local upload/download environment

Figure 26 Building up FTP local upload/download environment



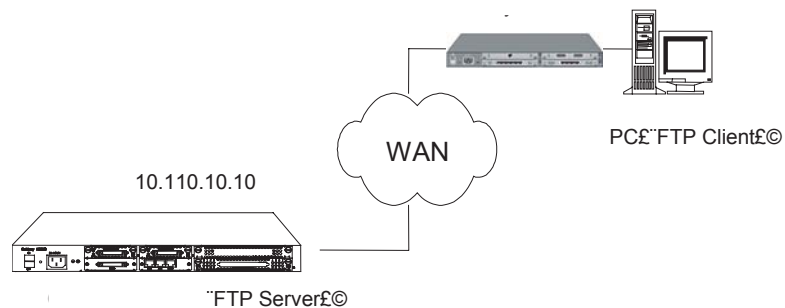
- 1 Connect the Ethernet interface on the router to the PC.
- 2 Assign an IP address for the Ethernet interface on the router. It is assumed to be 10.110.10.10.
- 3 Assign an IP address for the Ethernet interface on the PC. It is assumed to be 10.110.10.13.
- 4 Copy the application files, Boot ROM program or configuration files to a directory, which is assumed to be "C:\version".



CAUTION: The IP addresses of the network interface on the PC and the router's Ethernet interface must be on the same segment.

Build up FTP remote upload/download environment

Figure 27 Building up FTP remote upload/download environment



- 1 Connect the PC to any port of the router through a WAN. This approach does not require the IP addresses of the PC and the router to be on the same segment and is used for upgrading the router remotely.
- 2 Copy the application files, Boot ROM program or configuration files to a directory, which is assumed to be "C:\version".

Starting the FTP server Perform the following configurations with the help of the maintenance personnel at the router side:

1 Set authentication mode

You can select an AAA configuration scheme depending on the actual situation. F

2 Add user name and password

```
[Router] local-user router password simple 123 service-type ftp
```

"Router" represents the user name and "123" the password.

3 Add server type

```
[Router] local-user Router service-type ftp
```

4 Add right level

```
[Router] local-user Router level 3
```

5 Specify FTP directory

```
[Router] local-user Router ftp-directory flash:
```

6 Start FTP server.

```
[Router] ftp-server enable
```

With these operations, the FTP server has been started on the router and the username has been set. In this case, all the FTP client programs can use the username and password to log onto the FTP server.

Uploading/Downloading application, configuration file and Uploading Boot ROM program

1 Enter the directory containing the application file, Boot ROM program or configuration files in the DOS state. Execute the ftp command to set up an FTP connection with the router. For example:

```
C:\version\ftp 10.110.10.10
```

If the connection is set up, the following information will be displayed (taking Windows98 as an example):

```
Connected to 10.110.10.10
220 FTP server ready on Router at
User(10.110.10.10:(none)):
```

2 Log in the FTP server with the username and password set on the router.

```
User(10.110.10.10:(none)): Router
331 Password required for ftp
Password:
230 User ftp logged in
ftp>
```

The appearance of the prompt "ftp>" means that you can begin the upload/download operation.

3 Upload/Download the application files, Boot ROM program or configuration files.



By default, the application file and configuration file on the router are respectively named "system" and "config", the file of the extended Boot ROM program segment is named "bootrom", and the entire Boot ROM file name defaults to bootromall.

Upload the application program file or Boot ROM program or configuration file.

```
ftp>put
local file (Input the name of appplication/Boot ROM
program/Configuration file to be uploaded.)
remote file (Input the name of appplication/Boot ROM
program/Configuration file to be saved at the router side after
uploading.)
```

After the uploading is completed, the prompt "ftp>" will be displayed again. Enter <dir> to display the name and size of the file on the router. The size of the configuration file will be the same as that of the original file on the host if the uploading is successful.



CAUTION: After you have uploaded Boot ROM program using the put command, you should immediately use the upgrade bootrom [full] command to decompress the bootrom/bootromfull program from the root directory Flash, then write it into Boot ROM. At this point, the upgrade of Boot ROM is completed.

Download the application or Boot ROM program or configuration file.

```
ftp>get
local file (Input the name of appplication/Boot ROM
program/Configuration file to be saved.)
remote file (Input the name of ppplication/Boot ROM
program/Configuration file at the router side)
```

- 4 After implementing uploading/downloading, exit the FTP client program.

```
ftp>quit
```

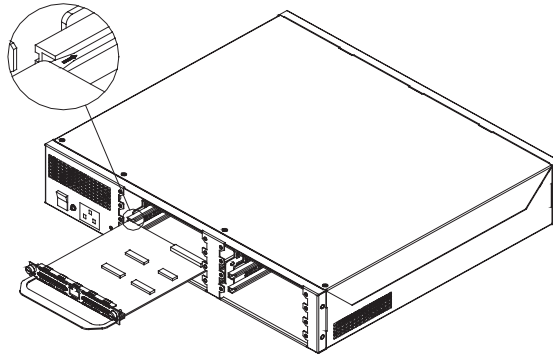
Recovering the Lost Router Password

If the Boot ROM password of router is lost, please contact the local agent of 3Com Corporation. The technician will help you enter the router's Boot ROM menu and reset the password.

Installing a Module

The procedure for installing a SIC or MIM is provided in the following list and shown in Figure 28.

- 1 Turn the router so the rear panel faces you.
- 2 Turn off the power switch of the router and unplug the power cord.
- 3 Remove the module and match its remote edge with the edge of the slot on the rear panel of the router.
- 4 Push the module into the router until it closely matches the rear panel of the router.
- 5 Fasten the module into the router with the captive screws.
- 6 Power on the router, and check the LEDs of the corresponding slot on the front panel. After the initialization of the module, if the LEDs for the corresponding slot are on, the module operates normally. If the LEDs for the corresponding slot remain off, the POST failed and you should contact your Service representative.

Figure 28 Installing a Module**Closing the Router
Chassis Cover**

To prevent cables from being pressed or cut off when you close the cover of the router chassis, roll up all the cables and put them into the chassis before closing the cover.

The Power LED is Off.

If the power LED is off, verify that:

- The power switch of the router is turned on.
- The power supply switch is turned on.
- The power cord of the router is connected properly.
- The power supply suits the requirement of the router.



Do not plug in or unplug the power cord when the power is on. After having checked the conditions in the previous list, if the power LED is still off, contact your Service representative.

Nothing is Displayed on the Terminal after Power-On

After the system runs the power-on self-test (POST), if the system operates normally, the start-up information is displayed on the console terminal. If the configuration system has a fault, the terminal may display nothing.

If the terminal does not display any information after the POST, verify that:

- The power system is operating normally.
- The console cable is connected correctly.

If the power system is normal and the console cable is connected properly, there may be something wrong with the console cable or the HyperTerminal parameters. Check the cable or the parameters.

HyperTerminal parameters should have the following values:

- Baud — 9600
- Data bits — 8
- Stop bit — 1
- Parity — None
- Flow control — None
- Terminal emulation — VT100

If the parameter settings do not match these values, reconfigure them.

If the previous checks do not solve the problem, contact your Service representative and follow the representative's instructions.

Illegible Characters Display on the Terminal after Power-On

If the system operates normally after the system runs the POST, the start-up information is displayed on the console terminal. If the configuration system has a fault, the terminal may display only illegible characters.

If the console terminal displays illegible characters after the POST, verify that the HyperTerminal parameters are set properly, as follows:

- Baud — 9600
- Data bits — 8
- Stop bit — 1
- Parity — None
- Flow control — None
- Terminal emulation — VT100

If the parameter settings do not match these values, reconfigure them.

Repeated Reboot

There are two possible situations in which the system reboots repeatedly:

- After `Now testing memory...` displays
- After `System now is starting...` displays, the system restarts repeatedly and displays, `Copied program error`.

Repeated reboots are caused by damage to the SDRAM. You can check whether the SDRAM has a fault by checking the LED status of the router. During the POST, the SLOT0 – SLOT2 LEDs and SERIAL0 LED light first. If the SLOT0 and SLOT1 LEDs are on instead, the SDRAM test has failed.

If the SDRAM is damaged, you must replace it. See “Replacing the SDRAM” on page 82.

Troubleshooting SICs and MIMs

The LEDs on the Router 5000 Family routers indicate whether the modules are properly installed. After the installation of a module, turn on the power and check the corresponding LED on front panel of the router. If the LEDs are on, the POST was successful and the router is working normally. If the LEDs are off, the POST has failed. You can test it using the following steps:

- Check that the port cable matches the port.
- Verify that the module is in normal operation by observing its LEDs .
- Use the **display** command to check whether the module or interface module has accepted the configuration.

All LEDs of the Encryption Accelerator MIM Remain off after Startup

After startup, all LEDs should blink once. If all indicators are off, the module or hardware on the module has not powered on. Check whether the power of the integrated equipment is properly connected.

If the power of the integrated equipment is in normal operation, the fuse of the module may have burnt out or the Complex Programmable Logic Device (CPLD)

may be out of order. In such a case and you should contact your Service representative.

After Startup, All LEDs Remain On.

After startup, all LEDs should once, which indicates that the processor of the module is in operation. If all LEDs are on, the module's system bus is not operating normally or the CPLD is out of order.

The RUN LED Remains On.

When the module is in operation, the RUN LED should blink, rather than remain on. If the RUN LED remains on, the module is powered on, but not operating normally. It is possible that the module has been forced to reset. If there are other LEDs that remain on simultaneously (for example, the ACT, SPEED, or DENY LEDs), the encryption card may be faulty. If the encryption card is operating normally, the faults may have occurred in the host.

The RUN LED Blinks Rapidly During Sartup

The rapid blinking of the RUN LED indicates that the module is initializing. During this period, if the DENY LED blinks occasionally, there is a memory fault. In this case, contact your Service representative to check the module. If, during initialization, the SPEED LED is occasionally on, the booting of the module system has failed. In this case, check the system configuration or contact your Service representative.

The RUN LED Blinks Slowly After Startup

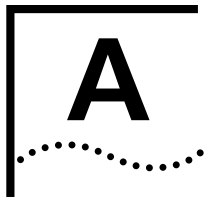
The slow blinking of the RUN LED indicates that the module is in offline. Check whether the router host is properly configured and supports the encryption card.

The ACT LED Remains On.

When the ACT LED is flashing green, the module is upgrading the firmware. If the ACT indictor remains on, the software upgrade has failed and the software should be upgraded once again. If the ACT LED remains on after a second attempt to upgrade, contact your Service representative.

The DENY LED Blinks during Normal Operation

When the DENY indictor blinks during normal operation, the module performance or capacity is not adequate for encryption demands. This situation is not a software or hardware failure. It is results from the technical specification limit of the existing encryption module version. If necessary, contact your Service representative to upgrade the encryption module with greater processing capability.



CABLE SPECIFICATIONS

The tables in this appendix describe the pinouts for the cables that you can use with Router 5000 Family routers. Pins that are not described in the following tables are not connected.

Console Cable

Table 16 Console Cable Pinouts

RJ-45	Signal Direction	DB-25	DB-9	Signal
1	—>	5	8	CTS
2	—>	6	6	DSR
3	—>	3	2	RXD
4	<—	8	1	DCD
5	-	7	5	GND
6	<—	2	3	TXD
7	<—	20	4	DTR
8	<—	4	7	RTS

AUX Cable

Figure 29 AUX Cable Assembly

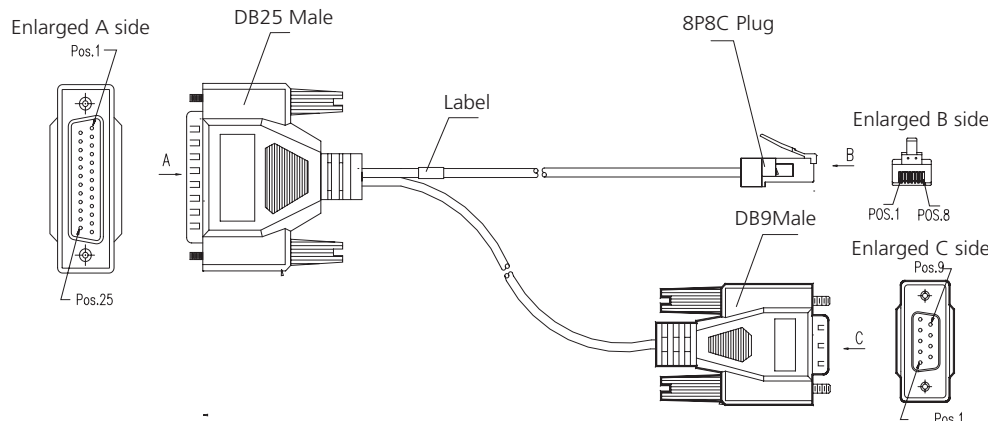


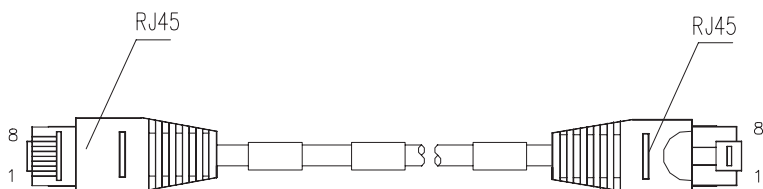
Table 17

RJ-45	Signal Direction	DB-25	DB-9	Signal
1	→	4	7	RTS
2	→	20	4	DTR
3	→	2	3	TXD
4	←	8	1	DCD
5	-	7	5	GND
6	←	3	2	RXD
7	←	6	6	DSR
8	←	5	8	CTS

Ethernet Cable

The Ethernet cable uses an RJ-45 connector and category 5 twisted pair cable.

Figure 30 Ethernet Cable Assembly



The Ethernet cables are classified as straight-through network cable and crossover network cable. They have the following features:

- Straight-through network cable — The sequences of the wires crimped at the RJ-45 connectors at each end are the same (see Table 18). The cable is used to connection between a terminal device, such as a PC or a router, and the Hub or LAN Switch. Straight-through network cables are delivered with the router.
- Crossover network cable — The sequences of the wires crimped at the RJ-45 connectors of the two ends are different (see Table 19). The cable is used in the connection between the terminal device, such as a PC or a router, and the terminal device. You can create this cable yourself, if necessary.

Table 18 Straight-through Network Cable Pinouts

RJ-45	Signal	Category 5 twisted pair	Signal Direction	RJ-45
1	TX+	White (Orange)	—>	1
2	TX-	Orange	—>	2
3	RX+	White (Green)	<—	3
4	-	Blue	-	4
5	-	White (Blue)	-	5
6	RX-	Green	<—	6
7	-	White (Brown)	-	7
8	-	Brown	-	8

Table 19 Crossover Network Cable Pinouts

RJ-45	Signal	Category 5 Twisted Pair	Signal Direction	RJ-45
1	TX+	White (Orange)	—>	3
2	TX-	Orange	—>	6
3	RX+	White (Green)	<—	1
4	-	Blue	-	4
5	-	White (Blue)	-	5
6	RX-	Green	<—	2
7	-	White (Brown)	-	7
8	-	Brown	-	8

You can use the table as a reference while distinguishing or preparing the two kinds of Ethernet cables. While preparing the Ethernet cables, follow the chromatogram given in this table to arrange the wires. Otherwise, communication quality will be affected even though the equipment at two ends is connected.

Serial Interface Cable

Synchronous and Asynchronous Mode

V.35 and V.24 (EIA/TIA-232) standards support synchronous operating mode. V.24 (EIA/TIA-232) also supports the asynchronous operating mode. The maximum transmission distance and baud rate of the signal vary with the operating mode.

Table 20 Transmission Rate and Transmission Distance of V.24 (EIA/TIA-232)/V.35 Cable

V.24 (EIA/TIA-232)		V.35	
Baud rate (bps)	Maximum transmission distance (m)	Baud rate (bps)	Maximum transmission distance (m)
2400	60	2400	1250
4800	60	4800	625
9600	30	9600	312
19200	30	19200	156
38400	20	38400	78
64000	20	54000	60
115200	10	64000	50
-	-	2048000	30



The baud rate should not exceed 64 Kbps when the V.24 cable operates in synchronous mode.

DTE and DCE Mode

The synchronous serial interface can operate in both DTE and DCE modes. For two devices connected directly, one device should operate in DTE mode, and the other device should operate in DCE mode. The DCE device provides a synchronous clock and specifies the transmission rate, the DTE device accepts the synchronous clock and communicates at the specified transmission rate. Usually, the router serves as the DTE device. To determine whether the device is a DTE or a DCE, refer to the user manual for the device.

Table 21 Typical DTE and DCE

Type of Equipment	Type of Interface	Typical Equipment
DTE	male	PC or router
DCE	female	Modem, multiplexer or CSU/DSU

The asynchronous serial interface generally is connected to a modem or a terminal adapter (TA) to act as the dial-up interface. You do not need to determine if the device is DTE or DCE, you must only select the appropriate baud rate.

The synchronous/asynchronous serial port cable is connected to a DB-50 receptacle. Proper connection cable needs to be selected for the protocol applied.

Four types of synchronous/asynchronous serial port cables are available. However, these cables are optional and you must select the proper one based on your requirements when you purchase the router. All these types of cables have a DB-50 adapter at one end.

At the network end, the connector is different for each type of cable, as described in the following list:

- V.24 (EIA/TIA-232) DTE cable — DB-25 (male) adapter
- V.24 (EIA/TIA-232) DCE cable — DB-25 (female) adapter
- V.35 DTE cable — 34-pin (male) adapter
- V.35 DCE cable — 34-pin (female) adapter

V.24 DTE Cable Assembly and Pinouts

Figure 31 illustrates the V.24 DTE cable assembly.

Figure 31 V.24 DTE Cable Assembly

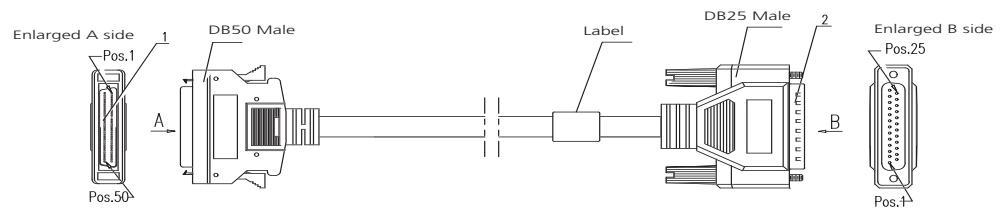


Table 22 describes the V.24 DTE cable pinouts.

Table 22 V.24 DTE Cable Pinouts

DB-50	Signal	Signal Direction	DB-25	Signal
5	TxD/RxD	→	2	TxD
27	RxD/TxD	←	3	RxD
2	RTS/CTS	→	4	RTS
31	CTS/RTS	←	5	CTS
6	DSR/DTR	←	6	DSR
30	DCD/LL	←	8	DCD
3	TxC/NIL	←	15	TxC
28	RxC/TxCE	←	17	RxC
1	LL/DCD	→	18	LTST
26	DTR/DSR	→	20	DTR
4	TxCE/TxC	→	24	TxCE
50	GND	-	1	Shield_GND
7	GND	-	7	Circuit_GND

V.24 DCE Cable Assembly and Pinouts

Figure 32 illustrates the V.24 DCE cable assembly.

Figure 32 V.24 DCE Cable Assembly

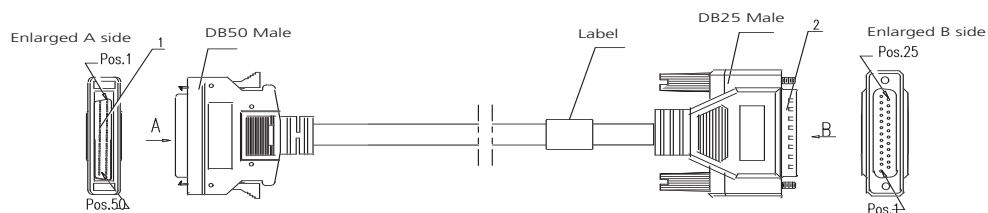


Table 23 describes the V.24 DCE cable pinouts.

Table 23 V.24 DCE Cable Pinouts

DB-50	Signal	Signal Direction	DB-25	Signal
5	TxD/RxD	→	3	RxD
27	RxD/TxD	←	2	TxD
2	RTS/CTS	→	5	CTS
31	CTS/RTS	←	4	RTS
26	DTR/DSR	→	6	DSR
1	LL/DCD	→	8	DCD
4	TxCE/TxC	→	15	TxC
29	NIL/RxC	→	17	RxC
30	DCD/LL	←	18	LTST
6	DSR/DTR	←	20	DTR
28	RxC/TxCE	←	24	TxCE
50	GND	-	1	Shield_GND
7	GND	-	7	Circuit_GND

V.35 DTE Cable Assembly and Pinouts

Figure 33 illustrates the V.35 DTE cable assembly.

Figure 33 V.35 DTE Cable Assembly

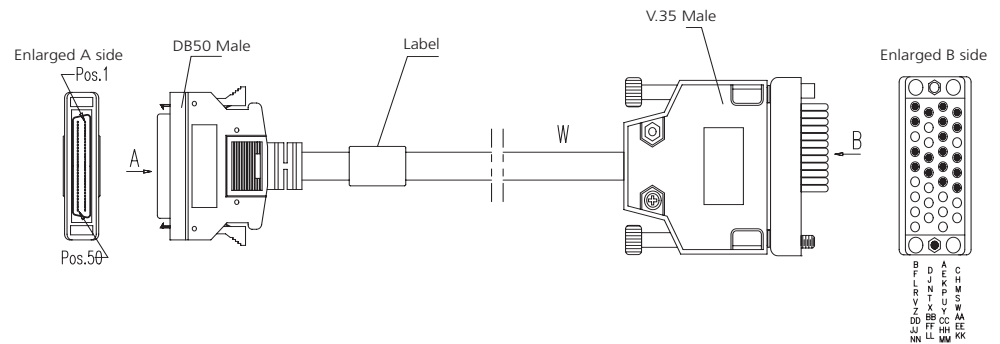


Table 24 describes the V.35 DTE cable pinouts.

Table 24 V.35 DTE Cable Pinouts

DB-50	Signal	Signal Direction	34PIN	Signal
2	RTS/CTS	→	C	RTS
31	CTS/RTS	←	D	CTS
6	DSR/DTR	←	E	DSR
30	DCD/LL	←	F	RLSD
26	DTR/DSR	→	H	DTR
1	LL/DCD	→	K	LT
15	TxD/RxD+	→	P	SD+
39	TxD/RxD-	→	S	SD-
20	RxD/TxD+	←	R	RD+
44	RxD/TxD-	←	T	RD-
16	TxCE/TxC+	→	U	SCTE+
40	TxCE/TxC-	→	W	SCTE-
19	RxC/TxCE+	←	V	SCR+
43	RxC/TxCE-	←	X	SCR-
18	TxC/RxC+	←	Y	SCT+
42	TxC/RxC-	←	AA	SCT-
50	GND	-	A	Shield_GND
7	GND	-	B	Circuit_GND
24	RxD-REST	GND	-	-
49	RxC-REST	GND	-	-
25	TxC-REST	GND	-	-

V.35 DCE Cable Assembly and Pinouts

Figure 34 illustrates the V.35 DCE cable assembly.

Figure 34 V.35 DCE Cable Assembly

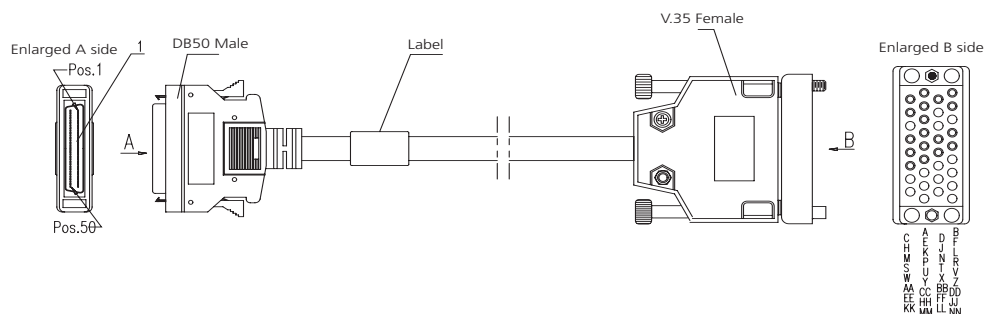


Table 25 describes V.35 DCE cable pinouts.

Table 25 V.35 DCE cable Pinouts

	Signal	Signal Direction	34PIN	Signal
31	CTS/RTS	<—	C	RTS
2	RTS/CTS	—>	D	CTS
26	DTR/DSR	—>	E	DSR
1	LL/DCD	—>	F	RLSD
6	DSR/DTR	<—	H	DTR
30	DCD/LL	<—	K	LT
20	RxD/TxD+	<—	P	SD+
44	RxD/TxD-	<—	S	SD-
15	TxD/RxD+	—>	R	RD+
39	TxD/RxD-	—>	T	RD-
19	RxC/TxC+	<—	U	SCTE+
43	RxC/TxC-	<—	W	SCTE-
17	NIL/RxC+	—>	V	SCR+
41	NIL/RxC-	—>	X	SCR-
16	TxCE/TxC+	—>	Y	SCT+
40	TxCE/TxC-	—>	AA	SCT-
50	GND	-	A	Shield_GND
7	GND	-	B	Circuit_GND
24	RxD-REST	GND	-	-
49	RxC-REST	GND	-	-

Dumb Terminal Adapter

Table 26 describes dumb terminal adapter pinouts.

Table 26 Dumb Terminal Adapter Pinouts

RJ-45 (female)	DB-25 (female)	Signal
1	8	DCD
2	6	DSR
3	20	DTR
4	7	GND
5	2	TxD
6	3	RxD
7	4	RTS
8	5	CTS

E1 Cable

Table 27 describes E1 cable pinouts. In this table, Tx = transmit and Rx = receive. These markings on 75-ohm coaxial cables are in relation to the routers, and they should be connected to the peer's "Tx" and "Rx".

Table 27 E1 Cable Pinouts

DB-15			RJ-45 (120-ohm twisted pair)	
	Tx Tip	Tx Tip	1	Tx Tip
2	Tx Ring	Tx Ring	2	Tx Ring
10	Tx Shield	-	3	Tx Shield
8	Rx Tip	Rx Tip	4	Rx Tip
15	Rx ring	Rx Ring	5	Rx Ring
7	Rx Shield	-	6	Rx Shield

T1 Cable

Table 28 describes T1 cable pinouts.

Table 28 T1 Cable Pinouts

RJ-45	Straight-through Shielded Network Cable	Signal	Description	RJ-45
1	White (Orange)	Rx	Ring	1
2	Orange	Rx	Tip	2
3	White (Green)	-	-	3
4	Blue	Tx	Ring	4
5	White (Blue)	Tx	Tip	5
6	Green	-	-	6
7	White (Brown)	-	-	7
8	Brown	-	-	8

ISDN cables

The ISDN S/T cable, shown in Figure 35, is a 4-core twisted pair cable. Both ends of the cable have RJ-45 connectors in which pin 3 and pin 6 are the sending end, and pin 4 and pin 5 are the receiving end.

Figure 35 ISDN S/T Cable



The ISDN U cable, shown in Figure 36, is a 2-core twisted pair cable. One end has an RJ11 connector and the other end has an output terminal (OT) connector.

Figure 36 ISDN U Cable



A

OBTAINING SUPPORT FOR YOUR PRODUCT

Register Your Product

Warranty and other service benefits start from the date of purchase, so it is important to register your product quickly to ensure you get full use of the warranty and other service benefits available to you.

Warranty and other service benefits are enabled through product registration. Register your product at <http://eSupport.3com.com/>. 3Com eSupport services are based on accounts that you create or have authorization to access. First time users must apply for a user name and password that provides access to a number of eSupport features including Product Registration, Repair Services, and Service Request. If you have trouble registering your product, please contact 3Com Global Services for assistance.

Purchase Value-Added Services

To enhance response times or extend warranty benefits, contact 3Com or your authorized 3Com reseller. Value-added services like 3Com ExpressSM and GuardianSM can include 24x7 telephone technical support, software upgrades, onsite assistance or advance hardware replacement. Experienced engineers are available to manage your installation with minimal disruption to your network. Expert assessment and implementation services are offered to fill resource gaps and ensure the success of your networking projects. More information on 3Com maintenance and Professional Services is available at <http://www.3com.com/>

Contact your authorized 3Com reseller or 3Com for a complete list of the value-added services available in your area.

Troubleshoot Online

You will find support tools posted on the 3Com web site at <http://www.3com.com/>

3Com Knowledgebase helps you troubleshoot 3Com products. This query-based interactive tool is located at <http://knowledgebase.3com.com> and contains thousands of technical solutions written by 3Com support engineers.

Access Software Downloads

Software Updates are the bug fix / maintenance releases for the version of software initially purchased with the product. In order to access these Software Updates you must first register your product on the 3Com web site at <http://eSupport.3com.com/>.

First time users will need to apply for a user name and password. A link to software downloads can be found at <http://eSupport.3com.com/>, or under the Product Support heading at <http://www.3com.com/>

Software Upgrades are the software releases that follow the software version included with your original product. In order to access upgrades and related documentation you must first purchase a service contract from 3Com or your reseller.

Telephone Technical Support and Repair

To obtain telephone support as part of your warranty and other service benefits, you must first register your product at <http://eSupport.3com.com/>

Warranty and other service benefits start from the date of purchase, so it is important to register your product quickly to ensure you get full use of the warranty and other service benefits available to you.

When you contact 3Com for assistance, please have the following information ready:

- Product model name, part number, and serial number
- Proof of purchase, if you have not pre-registered your product
- A list of system hardware and software, including revision level
- Diagnostic error messages
- Details about recent configuration changes, if applicable

To send a product directly to 3Com for repair, you must first obtain a return authorization number (RMA). Products sent to 3Com, without authorization numbers clearly marked on the outside of the package, will be returned to the sender unopened, at the sender's expense. If your product is registered and under warranty, you can obtain an RMA number online at <http://eSupport.3com.com/>. First time users will need to apply for a user name and password.

Contact Us

3Com offers telephone, e-mail and internet access to technical support and repair services. To access these services for your region, use the appropriate telephone number, URL or e-mail address from the list below.

Telephone numbers are correct at the time of publication. Find a current directory of support telephone numbers posted on the 3Com web site at

<http://csoweb4.3com.com/contactus/>

Country	Telephone Number	Country	Telephone Number
Asia, Pacific Rim Telephone Technical Support and Repair			
Australia	1 800 678 515	Philippines	1235 61 266 2602 or 1800 1 888 9469
Hong Kong	800 933 486	P.R. of China	800 810 3033
India	+61 2 9424 5179 or 000800 650 1111	Singapore	800 6161 463
Indonesia	001 803 61009	S. Korea	080 333 3308
Japan	00531 616 439 or 03 3507 5984	Taiwan	00801 611 261
Malaysia	1800 801 777	Thailand	001 800 611 2000
New Zealand	0800 446 398		
Pakistan	+61 2 9937 5083		

You can also obtain support in this region using the following e-mail: apr_technical_support@3com.com

Country	Telephone Number	Country	Telephone Number
Or request a repair authorization number (RMA) by fax using this number:			+ 65 543 6348

Europe, Middle East, and Africa Telephone Technical Support and Repair

From anywhere in these regions, call: +44 (0)1442 435529

From the following countries, you may use the numbers shown:

Austria	01 7956 7124	Luxembourg	342 0808128
Belgium	070 700 770	Netherlands	0900 777 7737
Denmark	7010 7289	Norway	815 33 047
Finland	01080 2783	Poland	00800 441 1357
France	0825 809 622	Portugal	707 200 123
Germany	01805 404 747	South Africa	0800 995 014
Hungary	06800 12813	Spain	9 021 60455
Ireland	1407 3387	Sweden	07711 14453
Israel	1800 945 3794	Switzerland	08488 50112
Italy	199 161346	U.K.	0870 909 3266

You can also obtain support in this region using the following URL:

<http://emea.3com.com/support/email.html>

Latin America Telephone Technical Support and Repair

Antigua	1 800 988 2112	Guatemala	AT&T +800 998 2112
Argentina	0 810 444 3COM	Haiti	57 1 657 0888
Aruba	1 800 998 2112	Honduras	AT&T +800 998 2112
Bahamas	1 800 998 2112	Jamaica	1 800 998 2112
Barbados	1 800 998 2112	Martinique	571 657 0888
Belize	52 5 201 0010	Mexico	01 800 849CARE
Bermuda	1 800 998 2112	Nicaragua	AT&T +800 998 2112
Bonaire	1 800 998 2112	Panama	AT&T +800 998 2112
Brazil	0800 13 3COM	Paraguay	54 11 4894 1888
Cayman	1 800 998 2112	Peru	AT&T +800 998 2112
Chile	AT&T +800 998 2112	Puerto Rico	1 800 998 2112
Colombia	AT&T +800 998 2112	Salvador	AT&T +800 998 2112
Costa Rica	AT&T +800 998 2112	Trinidad and Tobago	1 800 998 2112
Curacao	1 800 998 2112	Uruguay	AT&T +800 998 2112
Ecuador	AT&T +800 998 2112	Venezuela	AT&T +800 998 2112
Dominican Republic	AT&T +800 998 2112	Virgin Islands	57 1 657 0888

You can also obtain support in this region using the following:

Spanish speakers, enter the URL:

<http://lat.3com.com/lat/support/form.html>

Portuguese speakers, enter the URL:

<http://lat.3com.com/br/support/form.html>

English speakers in Latin America should send e-mail to:

lat_support_anc@3com.com

US and Canada Telephone Technical Support and Repair

1 800 876 3266

